

General

Guideline Title

Evaluation and management of mild traumatic brain injury: an Eastern Association for the Surgery of Trauma practice management guideline.

Bibliographic Source(s)

Barbosa RR, Jawa R, Watters JM, Knight JC, Kerwin AJ, Winston ES, Barraco RD, Tucker B, Bardes JM, Rowell SE, Eastern Association for the Surgery of Trauma. Evaluation and management of mild traumatic brain injury: an Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S307-14. [80 references] [PubMed](#)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: EAST Practice Management Guidelines Work Group. Practice management guidelines for the management of mild traumatic brain injury. Winston-Salem (NC): Eastern Association for the Surgery of Trauma (EAST); 2000. 29 p. [76 references]

Recommendations

Major Recommendations

The levels of recommendation (1-3) and classification of evidence (I-III) are defined at the end of the "Major Recommendations" field.

Note: Some recommendations from the 2001 Eastern Association for the Surgery of Trauma (EAST) mild traumatic brain injury (MTBI) guidelines are essentially unchanged in this update. However, a number of alterations and additions have been made. The previous admonition to obtain a brain computed tomographic (CT) scan in all patients with suspected brain injury has been modified to reflect the use of standardized criteria (such as the Canadian CT Head Rule [CCHR]) in some centers to identify patients that require a CT scan. The indications for emergency department (ED) discharge of patients with MTBI were examined in a number of high-volume studies since 2001, and our recommendation was changed to Level II to reflect this. Two specific recommendations on anticoagulated patients with MTBI were added.

Level 1

There are no level 1 recommendations.

Level 2

1. Clinicians should perform brain CT scan on patients that present with suspected brain injury in the acute setting if it is available.
2. If CT resources are limited, consideration may be given to the use of a set of standardized criteria (e.g., the Canadian CT Head Rule [CCHR], New Orleans Criteria [NOC]) to determine which patients with MTBI receive a brain CT scan. Clinicians should be aware that

this practice is associated with a nonzero missed injury rate.

Level 3

1. Clinicians should not routinely use magnetic resonance imaging (MRI), positron emission tomography, or nuclear magnetic resonance in the clinical management of patients with MTBI at the present time (Level 3).
2. Patients with an isolated MTBI and a negative brain CT scan result may be discharged from the ED if they have no other injuries or issues requiring hospital admission (Level 2).
3. Patients taking warfarin who present in the acute setting with an MTBI should have their international normalized ratio (INR) level determined. (Level 3).
4. Anticoagulated patients with supratherapeutic INR values and a normal initial brain CT scan result remain at significant risk for interval development of intracranial hemorrhage and should be admitted for a period of observation (Level 3).
5. Patients may be advised that measurable deficits in cognition and memory usually resolve at 1 month but that in 20% to 40% of cases, postconcussive symptoms may persist for 3 months or longer (Level 3).
6. The ability to safely operate a motor vehicle may be impaired for a variable length of time in patients with MTBI. The timing of resumption of driving should be individualized (Level 3).
7. The timing of returning to work for patients with MTBI should be individualized. Formal neuropsychologic testing can be considered in some cases (Level 3).
8. Biochemical markers such as S-100, neuron-specific enolase, and serum tau should not be routinely used in the clinical management of patients with MTBI except in the context of a research protocol (Level 3).

Definitions:

Classes of Evidence

Class I: Prospective, randomized clinical trials

Class II: Clinical studies in which data were collected prospectively or retrospective analyses based on clearly reliable data

Class III: Studies based on retrospectively collected data

Levels of Recommendation

Level 1: This recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data, however, strong Class II evidence may form the basis for a Level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, low quality or contradictory Class I data may not be able to support a Level 1 recommendation.

Level 2: This recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. This recommendation is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Mild traumatic brain injury (MTBI)

Note:

Mild traumatic brain injury is defined as an acute alteration in brain function caused by a blunt external force and is characterized by a Glasgow Coma Scale (GCS) score of 13 to 15, loss of consciousness for 30 minutes or less, and duration of posttraumatic amnesia of 24

hours or less. The terms mild traumatic brain injury and concussion may be used interchangeably.

A comprehensive review of the management of concussion in athletes is beyond the scope of this practice management guideline (PMG).

Guideline Category

Evaluation

Management

Clinical Specialty

Emergency Medicine

Internal Medicine

Neurological Surgery

Neurology

Nuclear Medicine

Pediatrics

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Emergency Medical Technicians/Paramedics

Health Care Providers

Hospitals

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To provide recommendations to facilitate optimal clinical management of mild traumatic brain injury (MTBI)
- To revise and expand on the Eastern Association for the Surgery of Trauma (EAST) 2001 recommendations

Target Population

Patients with mild traumatic brain injury (MTBI)

Interventions and Practices Considered

1. Computed tomography (CT) scan on patients with suspected brain injury
2. Use of standardized criteria (e.g., Canadian CT Head Rule)
3. A negative brain CT scan and an isolated mild traumatic brain injury (MTBI) patient can be discharged
4. Anticoagulated patients with supratherapeutic INR values should be admitted for observation

5. Timing of return to activities:

- Resolution of measurable deficits in cognition and memory is usually 1 month
- Resumption of driving motor vehicle is individualized
- Return to work is individualized

Note: Routine use of magnetic resonance imaging, positron emission tomography, nuclear magnetic resonance, or biochemical markers for the clinical management of MTBI is not supported at the present time.

Major Outcomes Considered

- Sensitivity and specificity of diagnostic tests
- Residual symptoms and postconcussive syndrome (PCS)
- Return to activity
- Adverse outcomes

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A search of PubMed and Cochrane Library databases was performed. Key words included *closed head injury*, *concussion*, and *traumatic brain injury* and included descriptors such as mild and minor. Additional references were obtained in the reference sections of retrieved articles, from review articles, and from Web resources. English-language references from 1980 to 2011 were examined, and articles published after 1999 were emphasized. A significant number of studies that were noncontributory were excluded. There was a notable lack of randomized, controlled trials, and it was not possible to restrict our review of any mild traumatic brain injury (MTBI) subtopic to such trials.

Number of Source Documents

A total of 112 articles were reviewed.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Class I: Prospective randomized clinical trials.

Class II: Clinical studies in which data were collected prospectively or retrospective analyses based on clearly reliable data.

Class III: Studies based on retrospectively collected data.

Methods Used to Analyze the Evidence

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Recommendations were characterized as Level 1, 2, or 3 in the same fashion as in other Eastern Association for the Surgery of Trauma (EAST) guidelines (see the "Rating Scheme for the Strength of the Recommendations" field).

Rating Scheme for the Strength of the Recommendations

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data, however, strong Class II evidence may form the basis for a Level I recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, low quality or contradictory Class I data may not be able to support a Level I recommendation.

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Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

All authors participated in critical revision and approved the final version.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Potential Benefits

Appropriate evaluation and management of patients with mild traumatic brain injury (MTBI)

Potential Harms

- The practice of obtaining a brain computed tomography (CT) scan for every patient that could conceivably have positive findings leads to a significant number of negative study findings and may also be burdensome from a financial and resource standpoint.
- Efforts to achieve an overall reduction on CT use will inevitably lead to a higher missed injury rate, although whether these injuries are clinically significant is debatable.

Contraindications

Contraindications

- Patients with a minor traumatic brain injury who are therapeutically anticoagulated (e.g., with warfarin, clopidogrel, or other agents) may warrant special consideration.
- Trauma patients in general have a significant incidence of individual symptoms that overlap with postconcussive syndrome (PCS), especially those with posttraumatic stress disorder. It has been noted that the high incidence of posttraumatic stress disorder in combat veterans is a significant confounding factor in terms of determining if reported symptoms are truly caused by the blunt head injury itself.

Qualifying Statements

Qualifying Statements

- The natural history of mild traumatic brain injury (MTBI) is poorly understood in part because the studies conducted thus far vary widely in their inclusion criteria, methodology, and outcome variables measured. The studies tend to be scattered across a wide variety of journals in a number of disciplines and originate in many different countries. As a result, there has been an accumulation of a large number of studies in which each uses a different measurement tool to describe a set of different outcome variables in its own unique study population.
- The epidemiology of MTBI remains poorly understood in part owing to inconsistent definitions and terminology. These factors make it difficult to determine exactly what percentage of all patients with traumatic brain injury (TBI) have an MTBI.
- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of the Eastern Association for the Surgery of Trauma.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."^{*} These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment.

^{*}Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2000 (revised 2012 Nov)

Guideline Developer(s)

Eastern Association for the Surgery of Trauma - Professional Association

Source(s) of Funding

Eastern Association for the Surgery of Trauma (EAST)

Guideline Committee

EAST Practice Management Guidelines Committee

Composition of Group That Authored the Guideline

Authors: Ronald R. Barbosa, MD; Randeep Jawa, MD; Jennifer M. Watters, MD; Jennifer C. Knight, MD; Andrew J. Kerwin, MD; Eleanor S. Winston, MD; Robert D. Barraco, MD; Brian Tucker, MD; James M. Bardes, MD; and Susan E. Rowell, MD

Financial Disclosures/Conflicts of Interest

The authors declare no conflicts of interest.

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Guideline Availability

Electronic copies: Available from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#) .

Print copies: Available from EAST, c/o Ronald R. Barbosa, MD, Legacy Emanuel Hospital, 2801 N. Gantenbein, MOB#130, Portland, OR 97227; email: Rbarbosa91@yahoo.com

Availability of Companion Documents

The following are available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. 2000 18 p. Available in Portable Document Format (PDF) from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#) .
- Pediatric concussions - Podcast #21. 2012. Available from the [EAST Web site](#) .
- Adult concussions - Podcast #22. 2012. Available from the [EAST Web site](#) .

Also, continuing medical education (CME) credit on pediatric and adult concussion is available from the [EAST Web site](#) .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on September 17, 2001. The information was verified by the guideline developer on September 27, 2001. This NGC summary was updated by ECRI Institute on May 7, 2013.

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